

REMARKS

Claims 1-6 stand rejected under 35 U.S.C. § 112 as being indefinite. The Examiner recites the limitation “diffusing along a grain boundary” in claims 1-2 and 4 as being unclear. In response, Applicants have amended claims 1-2 and 4 to recite “diffused” along a grain boundary.” Claim 13 has been amended to delete, among other things, “sparsely” and is considered to satisfy the statutory requirements of § 112. Accordingly, withdrawal of the § 112 rejection is respectfully requested.

Claims 1-4 and 13 stand rejected under 35 U.S.C. § 103(a) as being obvious over Bertero et al. (U.S. Patent No. 6,150,015) in view of Bian et al. (U.S. Patent No. 6,143,388). Applicants respectfully traverse the rejection.

The Examiner states in the Office Action that “it would have been obvious...to select non-magnetic CoCr as taught by Bian et al. as the ultra-thin nucleation layer used in Bertero et al.” The Examiner continues “One would have been motivated to make such a modification due to the teaching in Bian et al. that non-magnetic or magnetic CoCr is equivalent for use as an onset (nucleation) layer in a multi-layer magnetic recording medium.” Applicants respectfully disagree, and consider this to be impermissible hindsight. The Bertero and Bian references both fail to teach or suggest any particular motivation to introduce a non-magnetic property into a nucleation layer, such as that of the Bertero reference.

The present invention is directed to solving the problem of simultaneously achieving a minimization of the crystal grains within a Cr seed layer of a hard disk as well as achieving sufficient diffusion of Cr atoms along grain boundaries. The present invention solves the above problem by introducing a non-magnetic crystal layer between a seed crystal layer and a magnetic crystal layer. More particularly, the present invention is intended to establish an appropriate concentration gradient of the non-magnetic element between the seed crystal layer and the magnetic crystal layer. Since the cited references are not directed to solving this problem, there is no motivation to combine, and withdrawal of the rejection of claims 1-2 and 4 is respectfully requested. Claim 3 is dependent from claim 1 and is considered allowable based on its chain of dependency.

Regarding the rejection to claim 13, Applicants do not believe that the layered structures of the Bertero and Bian references are similar to each other. The crystal grains in the nucleation layer 13 of the Bertero reference appear to be spaced from each other on the Cr alloy layer 12. Under such circumstances, the nucleation layer 13 is not a continuous layer but a sparse existence of crystal grains, and the individual crystal grains function as cores for epitaxial growth. Moreover, the onset layer 14 of the Bian reference moderates a difference of lattice parameters between the Cr underlayer 13 and the magnetic layer 15. Therefore, the nucleation layer of the Bertero reference cannot be simply replaced with the onset layer of the Bian reference. Furthermore, the Bian reference refers to utilization of a non-magnetic material for the onset layer.

In contrast, claim 13 has been amended to call for, among other things, a layered polycrystalline structure comprising amorphous nucleation sites existing on a surface of a substrate apositioned spaced from each other, each of said amorphous nucleation sites being made of an aggregation of predetermined atoms. As amended, Applicants consider claim 13 allowable since the nucleation sites of the present invention are formed of an aggregation of atoms. The aggregation of atoms is believed distinguished from crystal grains, since the aggregation is amorphous. However, the Bertero reference teaches that magnetic layer grains grow epitaxially over the nucleation layer grains (see Col. 14, lines 17-19). That is, the epitaxial growth is established over a layer of crystal grains. In addition, the nucleation layer of the Bertero reference is a crystalline layer, and therefore is not directed to the present invention as defined in amended claim 13. For these reasons, withdrawal of the rejection to claim 13 is respectfully requested.

Claims 5 and 6 stand rejected under 35 U.S.C. § 103(a) as being obvious over Bertero et al. in view of Bian et al., and further in view of Okumura et al. (U.S. Patent No. 5,700,593). Applicants traverse the rejection for the reasons cited above with respect to the rejection of claims 1 and 4. Since claims 5 and 6 are dependent from claim 4, which is now considered allowable, claims 5 and 6 are also considered allowable.

New claims 21-23 recite further features of the present invention. More particularly, claims 21 and 22 are dependent from claim 1, and are considered allowable for the reasons stated with respect to the rejection of claim 1. Furthermore, if the nucleation


layer 13 of the Bertero reference functions as cores for epitaxial growth, then crystal grains within the nucleation layer 13 are believed to be smaller in size than crystal grains within the magnetic layer 14, which is contrary to new claim 21 of the present invention which calls for equal grain sizes. Additionally, the crystal grains in the magnetic layer 14 of the Bertero reference are forced to grow from the individual cores or crystals within the nucleation layer 13. Moreover, the epitaxial growth is believed to be separated between the magnetic layer 14 and the Cr alloy or seed layer 12. This is different than as recited in new claim 22, wherein the non-magnetic crystal layer has an epitaxial relationship to the seed crystal layer, and the magnetic crystal layer has an epitaxial relationship to the non-magnetic crystal layer.

New claim 23 is dependent from claim 13, and calls for at least the surface of the substrate to be amorphous. The nucleation layer of the Bertero reference exists on the surface of a Cr alloy crystal layer, and is therefore considered distinguished. For these reasons, allowance of new claims 21-23 is respectfully requested.

Applicants submit that this Application is in condition for allowance, which is respectfully requested. The Examiner is invited to contact the undersigned attorney if an interview would expedite the prosecution.

Respectfully submitted,

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March 18, 2003

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